

Lockout - Tagout: The Control of Hazardous Energies

You've Got the Power!



Lockout - Tagout: The Control of Hazardous Energies

Self-Study Course & Exam



To Receive Credit For This Course
Contact The Safety Office For A Test Or Print A
Copy From On-Line

Passing Grade is **70%** Or Better

Note: Information For The Exam Questions Can Be Found In This Presentation. You Will Also Need To Refer To And Take The Related Course on **Electrical Safety** Also Found On Safety's Webpage.

Lockout / Tagout (LOTO)

Per 29 CFR 1910.147

- **Purpose:** Protects Maintenance Personnel by **PREVENTING INJURY** From Unexpected Energization, Start Up Or Release Of Stored Energy By Mistake During Service or Maintenance
- **How:** Disable & Control ALL Energy Sources
- **Whenever:**
 - Remove / Bypass A Guard or Safety Device
 - Body Part in Machine Operation Danger Zone



Lockout / Tagout (LOTO)

Exceptions:

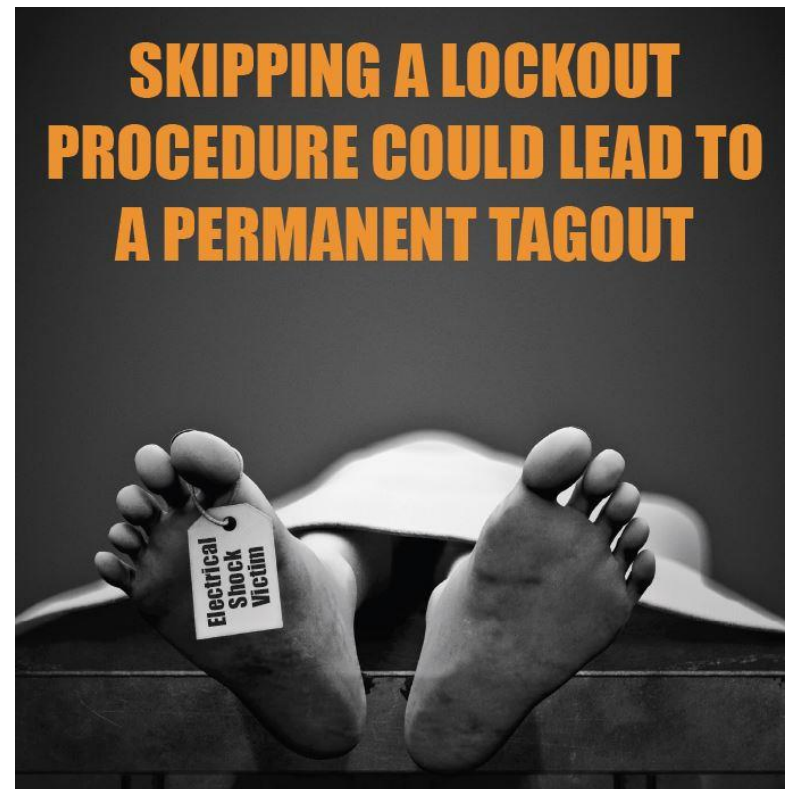
- Minor Adjustment & Servicing During Production
 - Provided There Is Effective Alternative Protection



- Equipment Hazard Controlled by Unplugging And Is Under The Control Of Employee Doing The Servicing or Maintenance

How Accidents Happen While Servicing Equipment

- 80% Failed To Turn Off Equipment
- 10% Equipment Activated By Someone Other Than Authorized Employee
- 5% Failed To Control Potential Energy
- 5% Disconnected Power But Failed To Verify Isolation



Frequency Of LOTO Accidents

- **10%** of all industrial accidents are LOTO-related
- **250,000** LOTO-related accidents each year, resulting in approximately:
 - **200** fatalities
 - **60,000** injuries



LOTO DEFINITIONS



- **AUTHORIZED EMPLOYEE** - The One Performing The Equipment Servicing And/Or Maintenance
- **AFFECTED EMPLOYEE** - Operates Machine Or Works In The Vicinity
- **ENERGY ISOLATING DEVICE** – A Mechanical Device That Physically Prevents The Transmission Or Release Of Energy
- **ENERGIZED** - Connected To Energy Source Or Contains Residual Or Stored Energy



LOTO

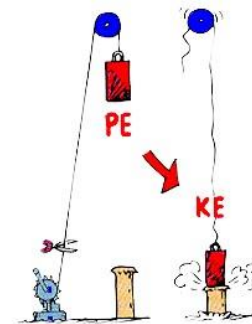
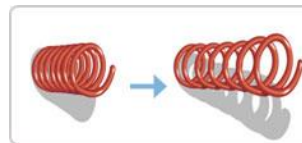
DEFINITIONS (cont.)

- **ENERGY** - Any Source of:

- Electrical
- Mechanical
- Hydraulic
- Pneumatic
- Chemical
- Thermal

- Other

- Stored
- Potential



LOTO

DEFINITIONS (cont.)

- **Lock Out** - Device Placed On An Energy Isolating Device In Accordance With Established Procedure To Ensure It And The Equipment Cannot Be Operated
 - On/Off Switches/Buttons Or Selector Switches Are NOT Energy Isolation Devices



LOTO

DEFINITIONS (cont.)

- **LOCKOUT DEVICE** - A Positive Means To Isolate The Equipment's Energy In A Safe Position Ensuring The Machine Can't Be Operated
 - Substantial Enough to Prevent Removal without Excessive Force / Unusual Techniques
 - Shall NOT be Used for Any Other Purpose
 - Examples:
 - Blank Flanges
 - Pins
 - Chains
 - Bolted Slip lock
 - Valve Clamps
 - Wedges



The *Ultimate* Lockout
Is A Lock!

Open



Ball Valve Lock Out



Closed

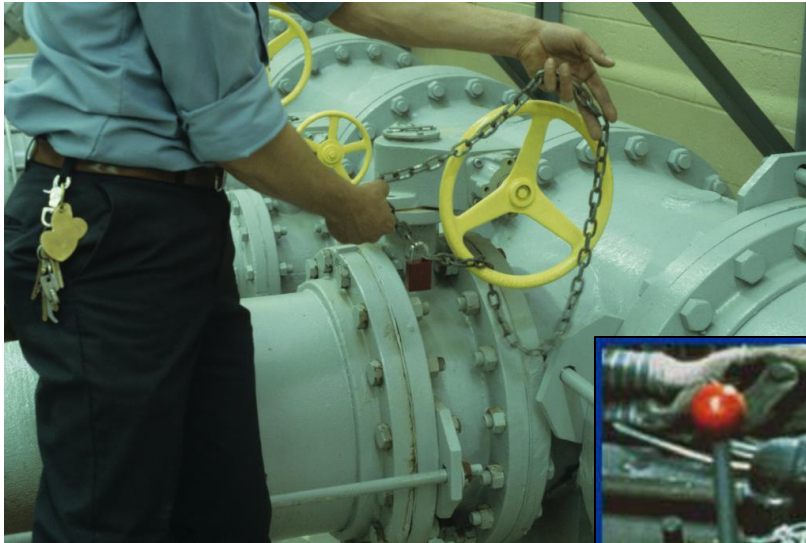


**Locked
&
Tagged**

Gate Valve Lock Out



Universal Valve Lockout



Chain

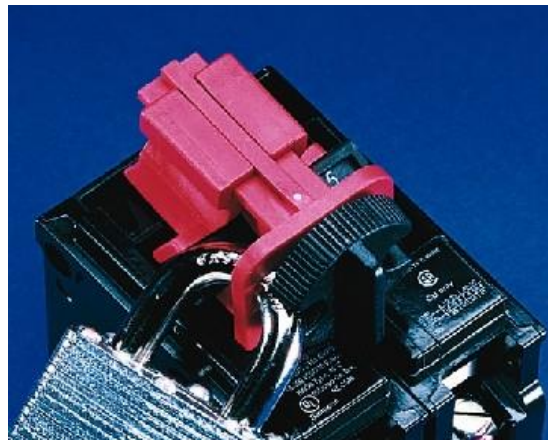
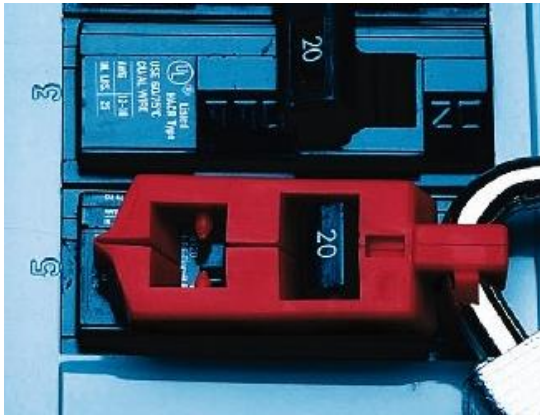


Cable



Electrical Lockout Devices

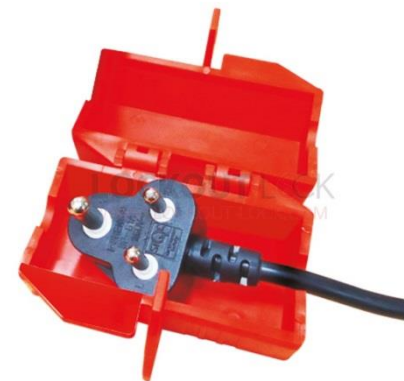
Circuit breakers



Wall Switches

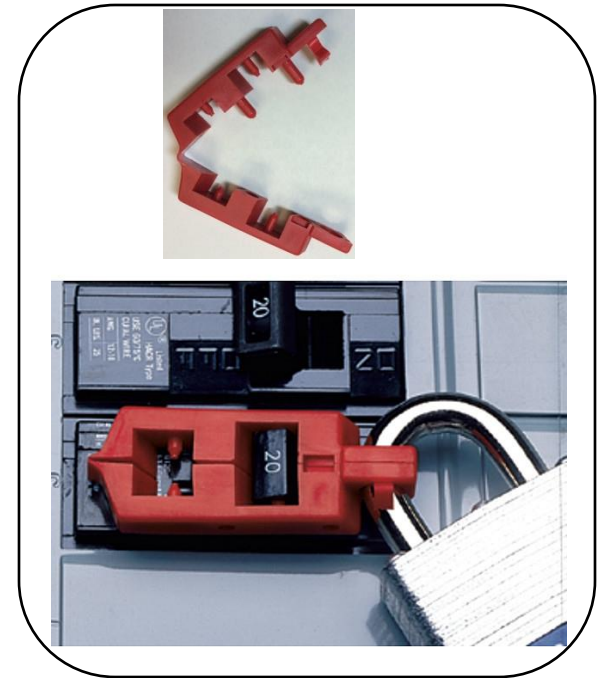


Fuses

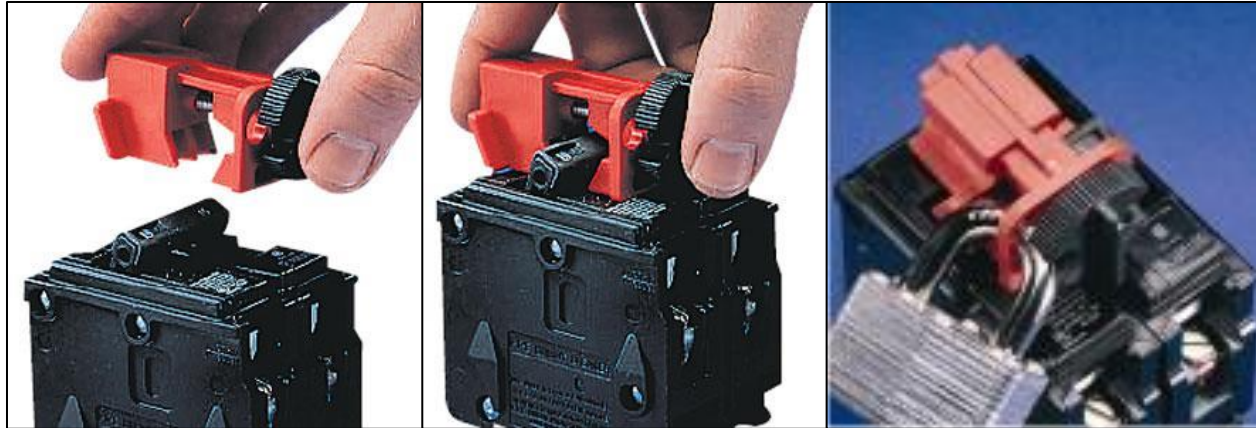


Plugs

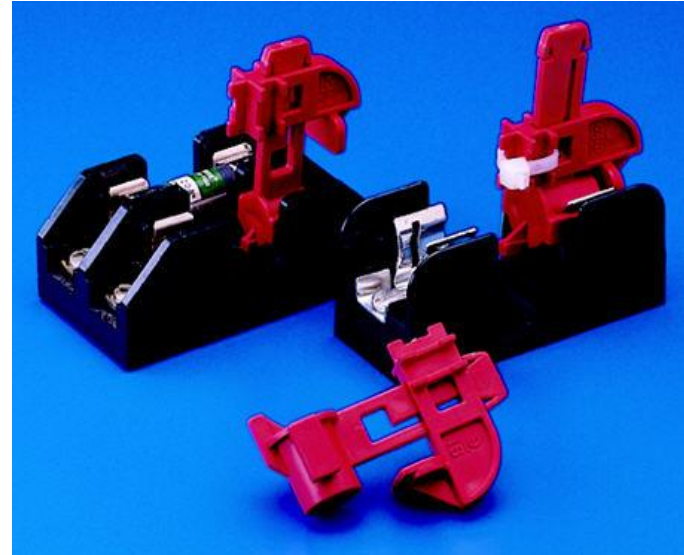
Single-Pole Electrical Lock Out



Multi-Pole Electrical Lock Outs



Fuse Electrical Lock Outs



Fuse Lockout Device



Fuse Blockout Device



LOTO

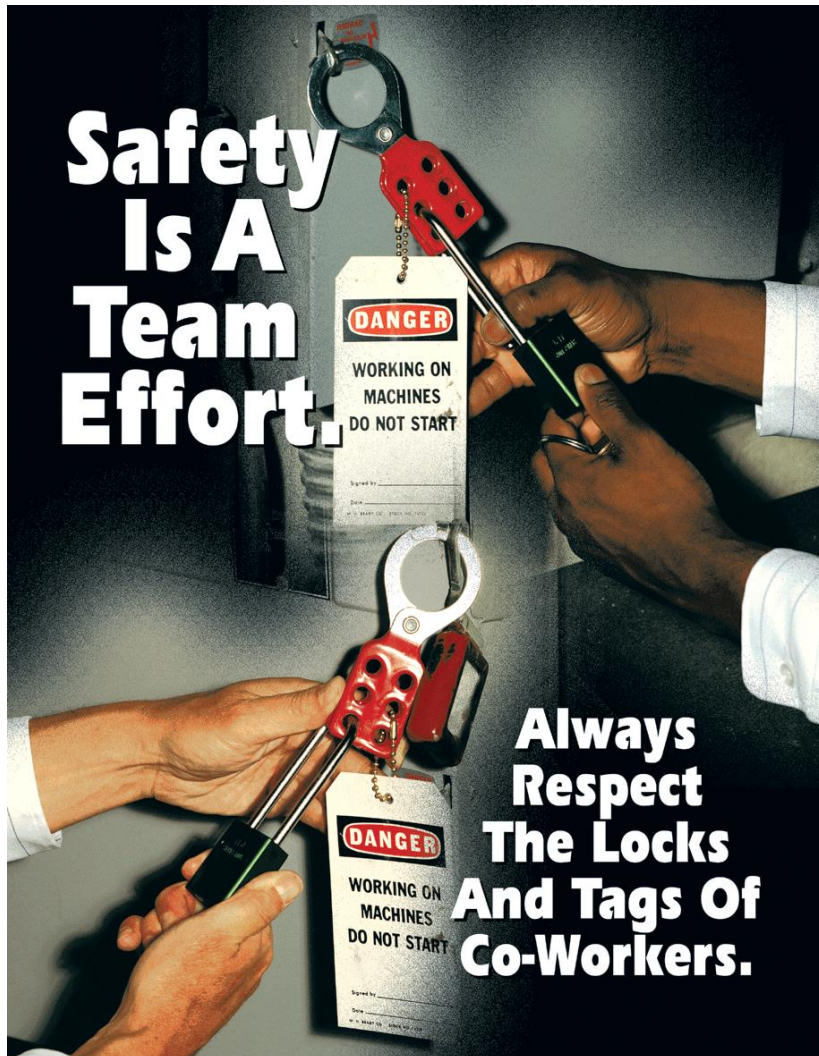
DEFINITIONS (cont.)



- **TAGOUT DEVICE**

- Instructs – “Do Not Operate” Equipment
- Warning Device Only - Does NOT Physically Prevent Equipment Activation
 - Intended To Be Used With Lock
- Must:
 - Be Legible
 - Attached Securely
 - Withstand Environment (Sun, Rain)
 - Not Be Removed Without Authorization





If An Energy Isolating
Device Is Capable Of Being
Locked Out Then It
SHALL Be Both
Locked Out ***AND*** Tagged Out

If Lockout is Not Feasible, Tag It

Only the Employee That Installed
LOTO Should Remove It

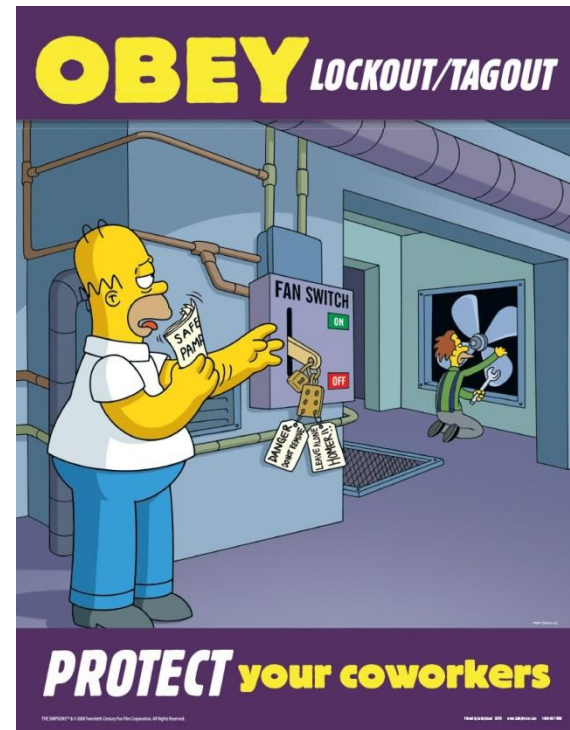
Supervisor Can Authorize LOTO
Removal When The Employee Is Not
Available

Must Inform the Employee Upon
Return to Work

LOTO

DEFINITIONS (cont.)

- **Service And Maintenance** - Activities Such As:
 - Constructing
 - Installing
 - Setting Up / Tool Changes
 - Adjusting / Unjamming
 - Inspecting
 - Lubricating
 - Cleaning
 - Modifying
 - Maintaining And / Or Servicing Machines Or Equipment



LOTO Procedure Requirements

- Different Procedure Required For Each Piece Of Equipment To Be Locked Out
- Multiple Machines Can Be Grouped Under One Procedure Only If They Have:
 - The Same Type And Magnitude Of Hazardous Energy
 - The Same Or Similar Means Of Controlling That Energy
- Documentation Not Needed For Single-source Equip
- Procedures Must Be Audited At Least Once Per Year

Lockout / Tagout




Procedure

1. Prepare For Shutdown
2. Shutdown The Equipment
3. Isolate All Energy Sources
4. Apply Lockout And Tagout
 - Isolation Devices
 - Locks
 - Tags
5. Safe Stored Energy
6. Verify Isolation

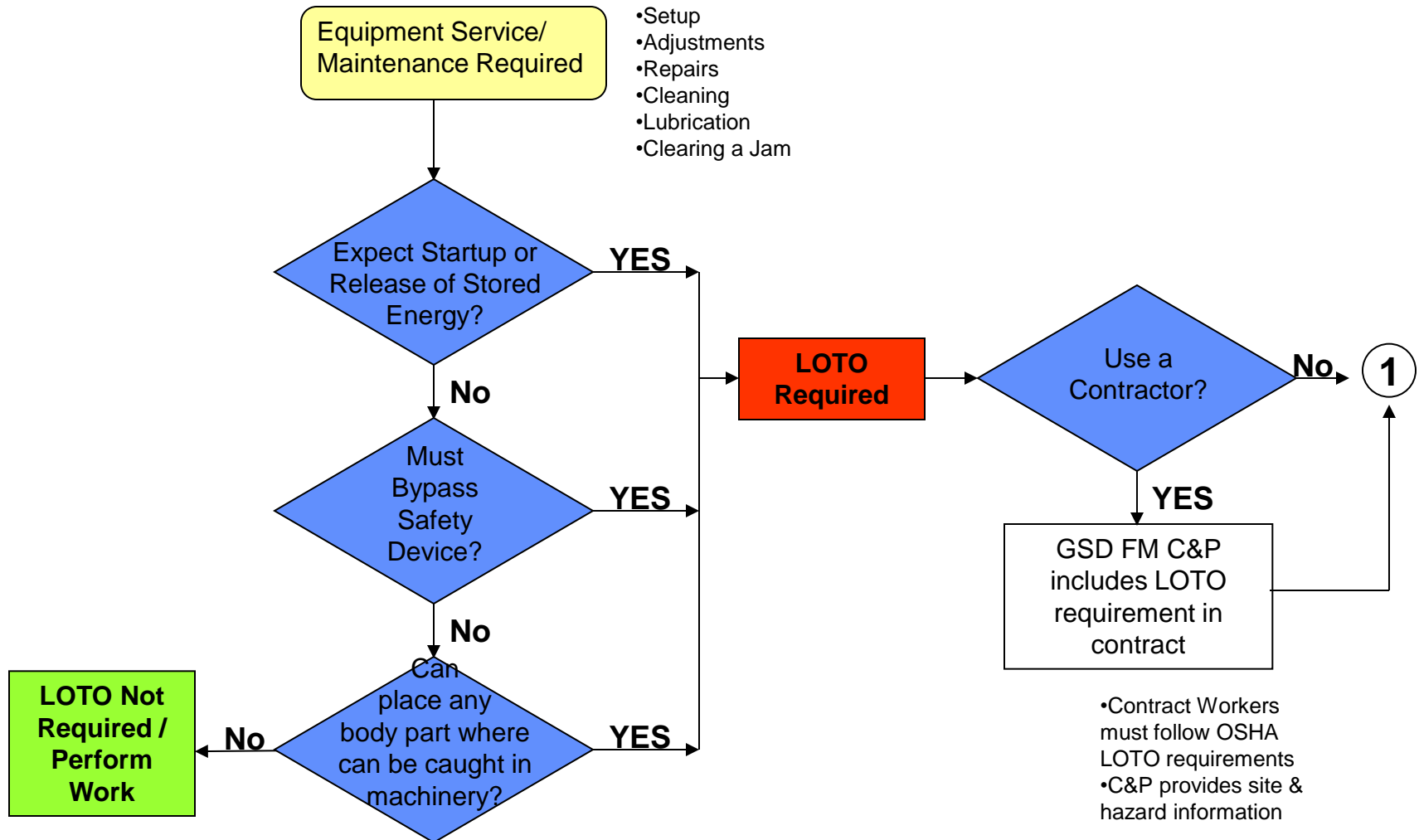


Sample Lockout Procedure

- Equipment identified at top
- Provides clear step-by-step instructions
- Uses color, pictograms to highlight energy sources
- Use of photos ensures that workers can quickly find the correct control points, avoiding lost time and mistakes

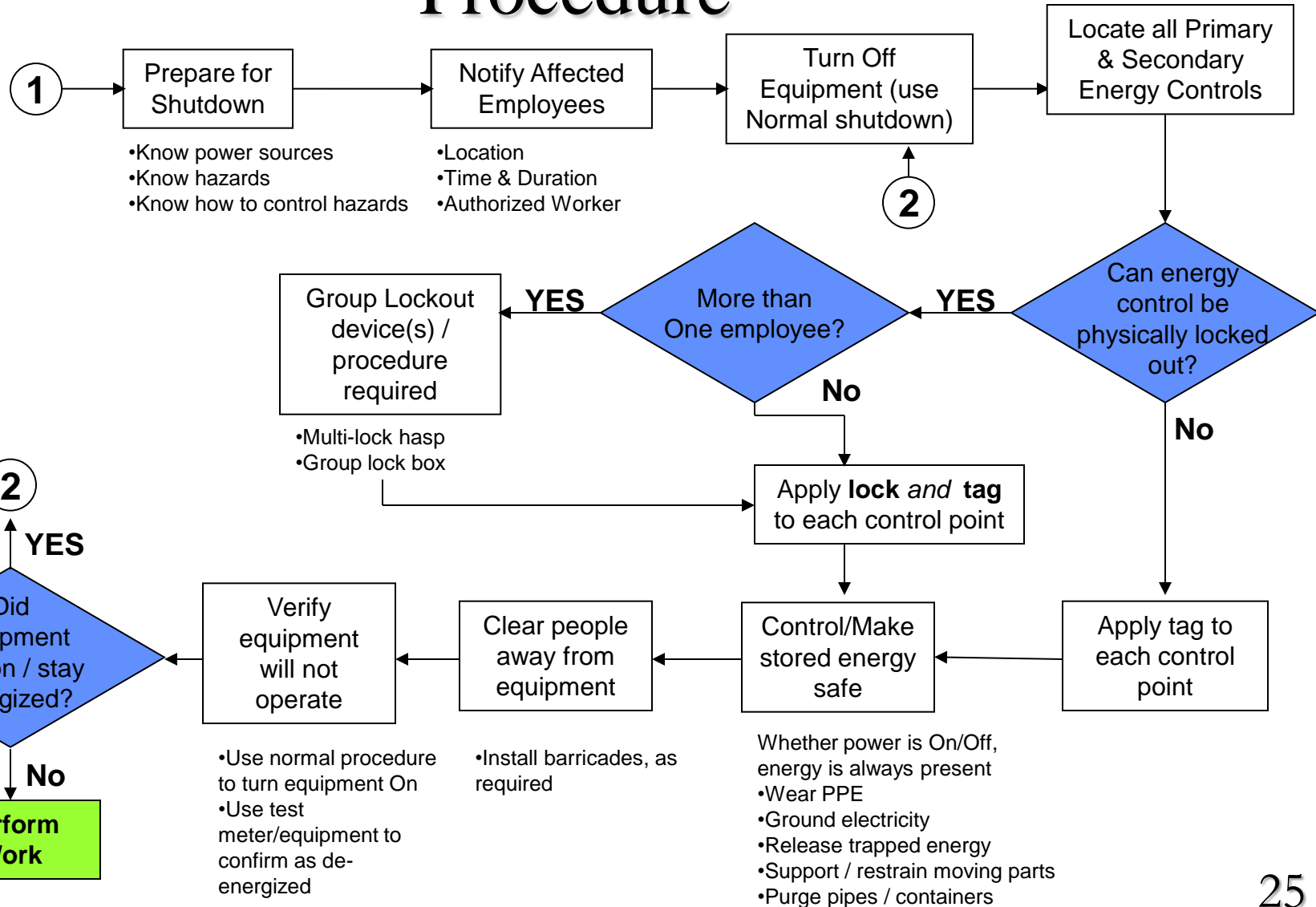
Lockout-Tagout Posted Procedure		
		
ID#: CMA-2 430266 Created: 7/23/2003 12:19:45 Revised: 7/23/2003 12:28:28	Facility: Carbin Road Description: Cell 463 B31 BTU Oven, Serial #5009	Location: Cell 150146
<div style="background-color: #cccccc; padding: 5px; display: inline-block;"> 4 Lockout Points </div>		
Lockout Application Process 1. Notify affected personnel. 2. Properly shut down machine. 3. Isolate all energy sources. 4. Apply lockout devices, locks, & tags. 5. Verify total de-energization of all sources.		
Step #	Action	Info
1.	Turn off the pilot.	The alarm will sound. Push the Silence button on the control panel to turn off.
2.	This machine is capable of generating extremely high temperatures. Leave door open for at least one hour to allow for proper cooling.	Oven Door 
3.	Turn the exhaust off.	The switch is located on the main control panel that is on the west side of the machine.
4.	Turn the recirc. off.	The switch is located on the main control panel that is on the west side of the machine.
5.	Turn the cooler fan off.	The switch is located on the main control panel that is on the west side of the machine.
6.	The E-1 Disconnect is located on the front side of the machine. Using a Lock, aluminum, blue, 1" (53020) lockout device, turn Disconnect to the off position and lock out at E-1.	Main Control Panel 
7.	The E-2 Exit Conveyor Disconnect is located on the North side of the control panel. Turn Disconnect to the off position and lock out at E-2.	Use a Lock, aluminum, blue, 1" (53020) lockout device.

Lockout / Tagout Procedure



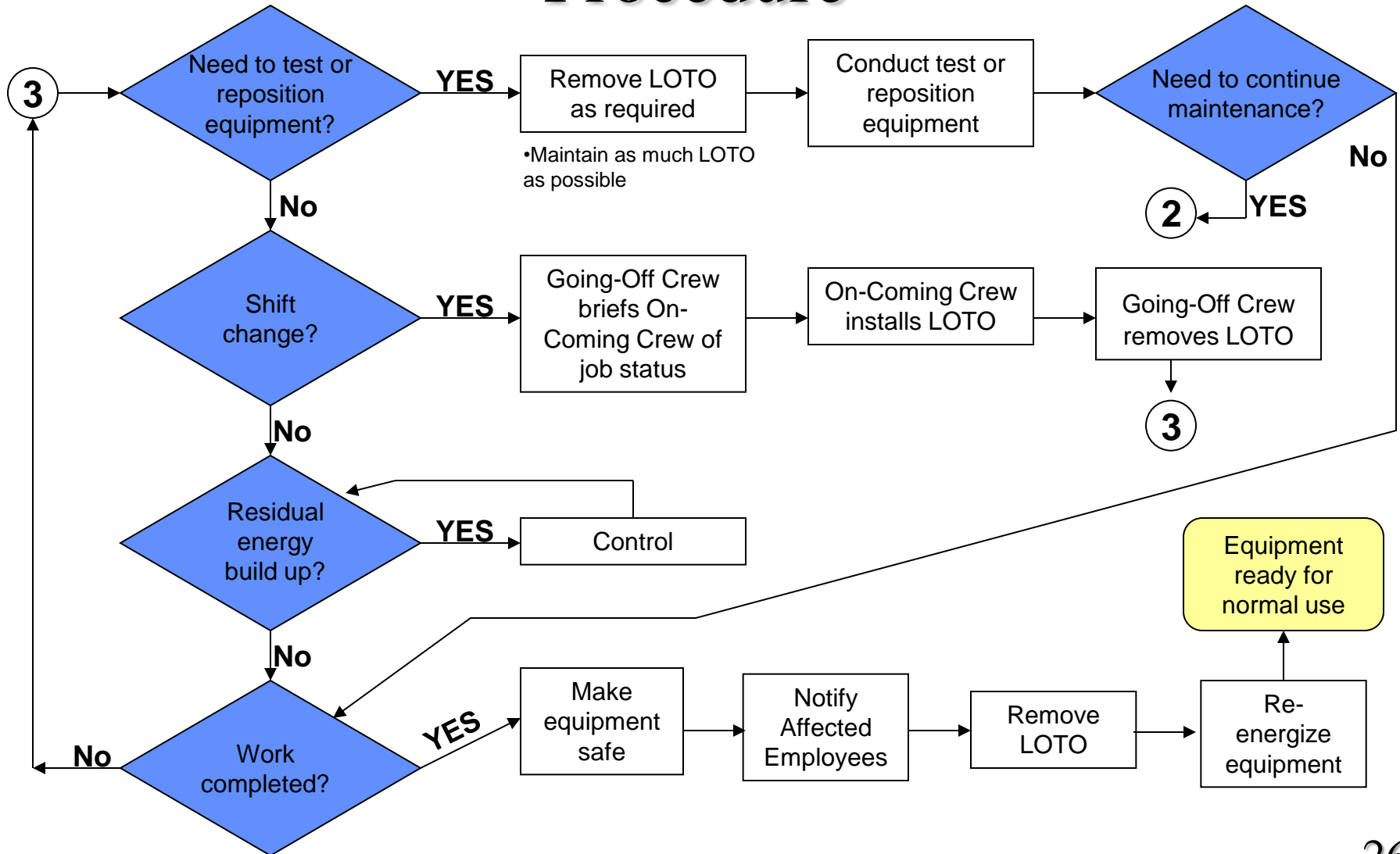
Lockout / Tagout

Procedure



Lockout / Tagout

Procedure



Lockout / Tagout

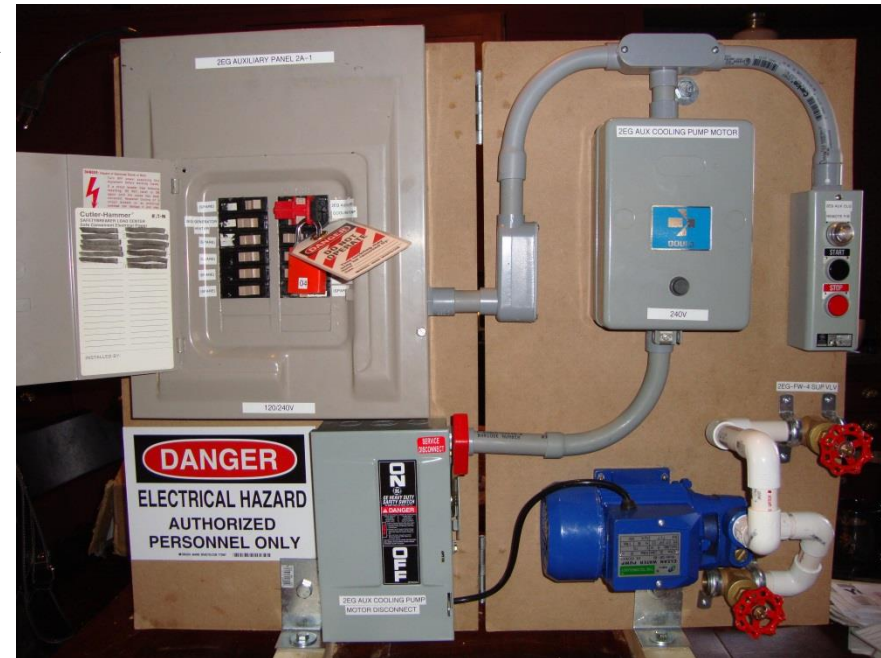
Procedure

- **Prepare for Shutdown**

Authorized Employee

Must Know:

- Types & Strengths of All Energy Sources
- Hazards of Each Energy
- Control Methods for Each Energy Hazard



Common Mistake: Only Identifying
A Machine's Main Power Source, i.e.,
its Electrical Power Source, But Not
Other Hazardous Energy Sources Also.
NEED TO DE-ENERGIZE ALL

Energy Source Identification

Identify Hazardous Energy Sources To
Prevent Mistakes, Speed Lockout Activity



Alternative Solutions:

- Stock Labels And Tags
- Do-it-yourself Printing Systems
- Custom Printed Or Engraved Tags



Visual Warnings



Lockout / Tagout

Procedure

- Notify All Affected Employees that LOTO is to be Applied for Servicing or Maintenance
 - Can Inform You of Other Items to Take Into Consideration



Lockout / Tagout

Procedure

- **Shutdown** - Turn Off Equipment Using Normal Procedures
- **Isolate** - Locate & De-Activate All Energy Isolating Devices
 - Switches to Off /Neutral
 - Equip May Have More Than One Energy Source
 - Main Electrical Power Switch Off
 - Close Valves



Lockout / Tagout

Procedure

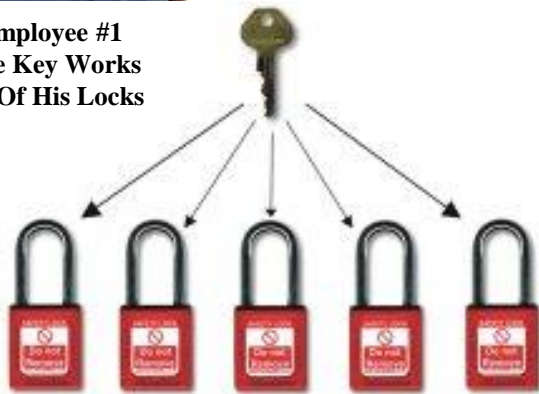
- **Apply LOTO**
 - **Apply Lockout Devices to ALL Energy Sources**
 - Place Lock on Disconnect Switches
 - Place Chain Through Valve Handle & Secure to Pipe or Stationary Object or Install Ball/Gate Valve Lockouts
 - Install Pipe Flanges
 - **Simultaneously Apply Tagout**
 - Preferred Method: Lockout AND Tagout
 - Tagout Only When Not Capable of Applying Lock



Exclusive Lock Control



Employee #1
One Key Works
All Of His Locks



- Each Employee Is Assigned A Set Of Locks All Keyed Alike & Same Color
- Employees Keep **Exclusive Control** Of The Keys For Locks They Use
 - *No Worker Should Be Able To Open Another Worker's Lock!*



Lockout / Tagout

Procedure

- Apply LOTO (cont.)
 - Never Lend Lock to Someone Else
 - Never Use for Other Purpose
 - Carry Key With You
 - If More Than One Employee Performing Service or Maintenance on a Machine, EACH Worker Must Attach Their Own LOTO Devices
 - Never Remove Someone Else's LOTO Device(s)
 - Promptly Remove Only Your LOTO Device(s) When Finished



Small Group Lockout - HASP



Using A Hasp, Each Employee Doing Maintenance Attaches Own Lock & Tag At Each Lockout Point



Large Group Lockout - LOCK BOX



A Designated Authorized Employee Takes Responsibility To:

- Control Group LOTO
- Coordinate Work Of Employees In Group
- Ensure Continuity Of Protection

GROUP LOCK-OUT PROCEDURES



1. Group Attaches LOTO On All Lockout Points
2. Place Keys Into Lock Box
3. Workers Place Their Own Locks Onto Lock Box & Keep Their Keys
4. Notify Affected Employees Then Perform Servicing Or Maintenance

When Maintenance Completed:

1. All Workers Remove Their Own Locks & Open The Lock Box
2. Get Keys From The Lock Box Then Unlocks And Removes All LOTO Devices.
3. Notify The Equipment Is Ready For Use.

Lockout / Tagout

Procedure

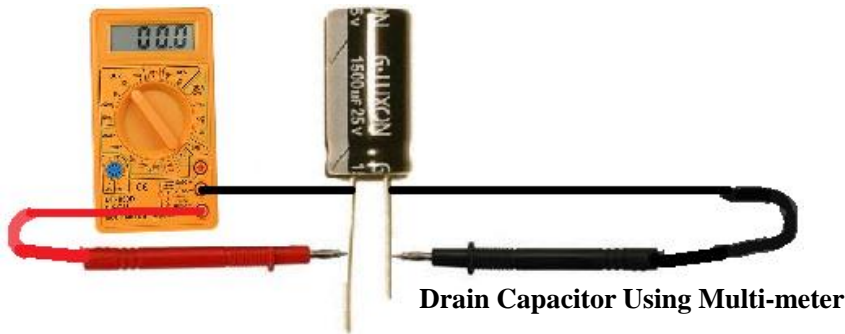
- Tagout Tag Identifies:
 - Who Applied The Lockout / Tagout
 - Contact Telephone Number
 - How Long The LOTO Is Expected To Be In Force



Lockout / Tagout

Procedure

- **Safe Stored Energy** - Dissipate All Potentially Hazardous Stored or Residual Energy
 - Relieve Pressure & Disconnect
 - Bleed Off Gas or Liquids Under Pressure
 - Place Springs Under Tension At or Near Neutral State
 - Restrain / Block Movement
 - Bleed/Discharge Capacitor Of Stored Charge



Open Downstream
Relief Valve



Lockout / Tagout

Procedure

- **Verify Isolation** - Test the Equipment to Ensure it is in a Zero Energy State
 - Check that No Persons are Exposed
 - Check Electrical Sources with Circuit Analyzer
 - Attempt to Operate Equipment Using Normal Controls
 - Return Equipment Controls to Neutral / Off

**Now Ready to Conduct
Servicing or Maintenance**



Lockout / Tagout

Procedure

- If Equipment Testing or Positioning is Required (**Temporary Re-Energization**)
 - Clear the Machine of All Tools, Materials & Non-Essential Items
 - Clear Employees from the Area
 - Remove LOTO Devices
 - Energize & Proceed with Testing/Positioning
 - De-Energize And Re-Apply All LOTO
 - Continue Servicing / Maintenance



Lockout / Tagout

Procedure

- **Shift Change** - Relief Workers Attach LOTO Devices Prior To You Removing Yours
 - Use Safety Hasp For Multiple Locks
- **Lost Key** - Report To Your Supervisor Immediately & Re-Key Locks Or Replace
- **Employee Not Available** – Supervisor Authorizes To Remove Lock(s)
 - Master Key
 - Cut Off



Lockout / Tagout

Procedure

- Restore Equipment to Operation (End LOTO)
 - Remove Nonessential Items
 - Return Equipment Components and Guards (Equipment Is Intact)
 - Remove & Account for All LOTO Devices
 - Ensure All Employees Are Safe Before Reenergizing the Equipment
 - Restart And Notify Affected Employees the Equipment is Ready for Use



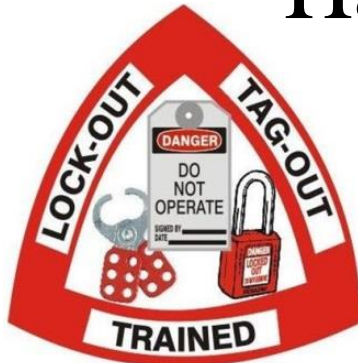
LOCKOUT / TAGOUT (LOTO)

CONTROL OF HAZARDOUS ENERGY



- ***YOUR COMMITMENT***

to Use LOTO with
Locks and Tags, is
What Controls
Hazardous Energy



Lockout - Tagout: The Control of Hazardous Energies

Course Exam **Remember**



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Completed Test To The Safety Office

Passing Grade is **70%** Or Better